Wednesday, January 25, 2017

- ✓ **HW Questions**
- ✓ **6.4 - The FUNdamental Theorem of Calculus:**
  - ○ **Explainer -Antiderivative FTC**
  - ○ **Practice - Integral Evaluation FTC**

Quiz Friday on 6.3 - Short!

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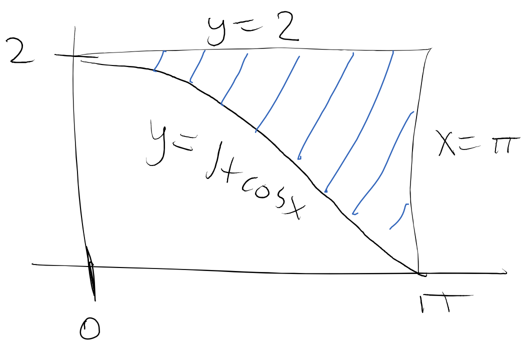

$A_{SH} = A_{RECT} - A_{\text{under curve}}$

$= \pi(2) - \int_0^{\pi} (1+\cos x)\,dx$

$= 2\pi - \left[x + \sin x\right]_0^{\pi}$

$= 2\pi - \left[\pi + \sin\pi - (0+\sin 0)\right]$

$= 2\pi - (\pi + 0 - 0 + 0)$

$= \boxed{\pi}$

FTC: Antiderivative Part - Explainer

$$\boxed{\frac{d}{dx}\int_a^x f(t)\,dt = f(x)}$$

Find:

① $\frac{d}{dx}\int^{x} \sin\theta\, d\theta = \boxed{\sin x}$

find:

(1) $\frac{d}{dx}\int_2^x \sin\theta\, d\theta = \boxed{\sin x}$

$\rightarrow \frac{d}{dx}\left[-\cos\theta\right]_2^x = \frac{d}{dx}\left[-\cos x - (-\cos 2)\right]$

$= \frac{d}{dx}(-\cos x) + \frac{d}{dx}\cos 2$

$= \boxed{\sin x} + 0$ ✓

(2) $\frac{d}{dx}\int_7^{x^2+x} \sec^2 t\, dt = \boxed{\sec^2(x^2+x)(2x+1)}$

$\rightarrow \frac{d}{dx}\left[\tan t\right]_7^{x^2+x} = \frac{d}{dx}\left[\tan(x^2+x) - \tan 7\right]$

$= \frac{d}{dx}\left(\tan(x^2+x)\right) - \frac{d}{dx}\tan 7$

$= \boxed{\sec^2(x^2+x)(2x+1)} - 0$ ✓

(3) $\frac{d}{dx}\int_{18}^{2x} \sin^2\theta\, d\theta = \boxed{\sin^2(2x)\cdot 2}$

$\rightarrow \frac{d}{dx}\left[F(\theta)\Big|_{18}^{2x}\right] = \frac{d}{dx}\left(F(2x) - F(18)\right)$

$= \underbrace{\frac{d}{dx}(F(2x))}_{\text{Inverses}} - \underbrace{\frac{d}{dx}(F(18))}_{\text{constant}}$

$= \boxed{\sin^2(2x)\cdot 2} - 0$ ✓